

Department of Neurology, Division of Cognitive Neurology

SUMMARY OF CENTRAL AUDITORY TEST RESULTS

RE: Christian Alexis
DOB: 08-09-91
JHII#: 2-342-23-00

Date of Exam: 10-16-01
Referred By: parental referral

Christian is a 10 year-old, right-handed male seen for central auditory testing at the request of his mother (Ms. Nancy Britos). Christian was accompanied today by his mother and was seen for a total of 2 hours. He was cooperative for all testing. Although Christian expressed initial apprehension about the testing, he responded well to verbal encouragement and quickly appeared more comfortable. No hyperactive behaviors were observed. Test-retest showed his performance to be largely consistent throughout the session. Christian required additional time to respond on most of the tests administered today.

CASE HISTORY

Case history is based on a questionnaire completed by Christian's mother and a brief parental interview at the time of testing. No complications were reported during the pregnancy or birth. There is a history of speech-language delays. At age 2 years, his expressive vocabulary was estimated to be 10 words. Articulation difficulties were first noted around 4 years of age. His mother reported that Christian had difficulty learning the meanings of words. There were no reports of early chronic ear infections, motor delays, neurological disorders, or head trauma. Hearing, vision, and motor function are considered normal. There is early evidence of an atypical sensitivity to sound (hyperacusis), although his mother noted recent improvement in this area. There is a family history of reading difficulties (dyslexia, paternal and maternal sides). No concerns were raised about attention or social-behavioral difficulties. Christian is not currently taking medication.

Christian is enrolled in a mainstream academic environment, where he receives services through his IEP in reading. Christian's parents have arranged for him to receive speech therapy twice a week outside of school. Christian had difficulty learning the alphabet and his mother noted that he continues to mispronounce words when reading aloud. Word retrieval problems have also been documented.

EXHIBIT

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AUDIOLOGICAL SCREENING

Otoacoustic Emission screening elicited reliable responses at 1000-6000 Hz bilaterally, suggesting normal cochlear function within the speech range. Pure tone testing at 500 Hz showed normal thresholds for the right ear, with borderline normal thresholds for the left ear. Tympanometry showed normal middle ear pressure and compliance bilaterally.

CENTRAL AUDITORY TESTING

1. **SCAN-C.** A central auditory screening test for children comprised of 4 subtests designed to identify common features of central auditory processing disorders: 1) difficulty understanding degraded speech information (low pass filtered at 500 Hz); 2) difficulty understanding speech in background noise; and difficulty with binaural separation of 3) dichotic monosyllabic words and 4) dichotic sentences.

Results. Christian performed in the normal range on the auditory figure-ground subtest of the SCAN-C. His performance on the competing words and competing sentences subtests was in the borderline range (1-2 standard deviations below the mean) for his age. His filtered word subtest score fell in the impaired range (2-3 standard deviations below the mean). An atypical right-ear advantage was noted on competing words subtest (right-ear first condition). On competing sentences, Christian was able to identify correctly only 3/10 phrases presented to the left ear under dichotic conditions. His composite standard score (66) was in the impaired range for his age.

2. **SSW** (Staggered Spondaic Word test) is a gated dichotic listening test that uses spondee words (e.g. baseball, hotdog). Scores were corrected for possible effects of peripheral hearing loss, using percentage correct on the W22 word recognition list.

Results. Christian's performance was moderately impaired on the SSW. A sharp left-ear competing error peak was noted, with no significant ear or order effects. Christian made a significant number of reversals, suggesting short-term auditory memory difficulties. No TEC category differences were observed when his adjusted and corrected scores were compared, indicating no adverse attention effects.

3. **Syllable discrimination in quiet.** Syllable and word pairs, presented in quiet, were judged as same or different. Pairs were contrasted by syllable initial consonants (e.g. pat-bat) or by medial vowel (e.g. pat-pit). Christian scored 81% on this test (age norms = 96-100%).
4. **Token test.** Christian was asked to manipulate tokens of different shapes and colors. He scored 100% on single-step verbal directions. On two-step verbal directions his score was 90% correct. Christian was unable to implement two-step verbal directions without repetition/verbal rehearsal, reporting that it helped him to remember.

5. **Pitch Pattern Sequence** test was administered to assess inter-hemispheric transfer of non-verbal auditory information that is sequenced. Christian scored 100% for the right ear and 71% for the left ear, using a verbal response.
6. **The Speech in Noise (SIN)** test measures sentence recognition when the signal-to-noise ratio is varied from +15 to 0 dB S/N. Overall, Christian demonstrated a performance function that was similar in shape to that of age-matched normal control subjects.
7. **The Phoneme Synthesis Test (PS)** measures ability to synthesize speech sounds (phonemes) into words. His quantitative score (13) was below the lower limit of normal (21) for his age. Qualitatively, Christian scored 13 correct (age-normed score 20), placing him below the normal range for his age. His errors occurred largely in the second (longer) half of the test, suggesting that short-term memory difficulties may have affected his performance. Qualitatively his errors showed evidence of phonological perseverations (spoken for spoon, spoken for stone, speaked for train).
8. **Word recognition in quiet (CID W22 list, 40 dB SL)** was excellent bilaterally (right ear: 96%, left ear = 100%).
9. **Digit Span.** Christian correctly repeated 4 digits forward, 2 digits backward. His scaled score (7) was below the normal range for his age (10 ± 2).
10. **Word Rhyming (auditory, picture) task** was administered to assess phoneme decoding. Christian scored 88% correct on the auditory rhyming test and 100% on the picture rhyming test. The discrepancy in his auditory and picture rhyming scores suggests possible auditory memory difficulties.
11. **Syntactic comprehension** was evaluated by auditory presentation of active and embedded passive phrases using a picture-matching response format. Christian correctly identified 100% of the active constructions and 100% of the embedded passive constructions suggesting intact syntactic comprehension.

IMPRESSIONS AND RECOMMENDATIONS

1. Test results are consistent with the presence of an auditory processing disorder.
2. Two areas of processing difficulty were identified, including phoneme processing and short-term auditory memory.
3. Phoneme processing refers to the ability to decode and synthesize (blend) speech sounds (consonants, vowels) and is considered important for development of reading and spelling. Christian would benefit from an intervention program designed to improve his phoneme processing skills. There are a number of audiotape and software programs available for this purpose. His teachers and/or speech therapist may already

have access to such materials. Additional recommendations can be made if needed. In light of his phonological processing difficulties, Christian is also likely to benefit from a structured approach to reading (e.g. Orton-Gillingham method or a similar program).

4. Christian demonstrated short-term auditory memory difficulties. This may account, in part, for his difficulty following verbal directions. He will benefit from receiving verbal directions one-at-a-time, with use of repetition and rephrasing to confirm comprehension. He is also likely to benefit when the same information is presented in multiple modalities (auditory + visual).
5. The atypical right-ear advantage for speech on dichotic listening and the right-left asymmetry in his pitch pattern scores are suggestive of neuromaturational delays. Re-testing in 9-12 months (there is no additional fee) is recommended to monitor development in this area. Follow-up with Christian's pediatrician is also recommended to determine if additional neurological testing is warranted.
6. Based on test results, preferential classroom seating is strongly recommended. Christian would also benefit from having additional time to respond to verbal questions in class.

I can be contacted directly at (410) 955-0221 with questions or concerns about this report.

Dana Boatman
Dana Boatman, Ph.D., CCC-A

CC: File; Ms. Nancy Britos (per her request)